CLAIMS

1. A reciprocating compressor comprising:

   a linear motor;

   at least one piston and cylinder arrangement, the piston and cylinder arrangement comprising a cylinder, a piston configured and disposed to travel in the cylinder and a piston rod connected to the piston; and

   a mechanism operatively connecting the linear motor to the at least one piston and cylinder arrangement to move the piston in the cylinder upon operation of the linear motor, the mechanism having a mechanical configuration to limit overtravel and undertravel of the piston in the cylinder.

2. The compressor of claim 1 wherein the mechanism comprises a connecting rod and eccentric.

3. The compressor of claim 1 wherein the mechanism comprises a cam mechanism.

4. The compressor of claim 1 wherein the mechanism comprises a wobble plate mechanism.

5. The compressor of claim 1 wherein the mechanism comprises a gear mechanism.

6. The compressor of claim 5, wherein the gear mechanism comprises a linear gear connected to the linear motor.

7. The compressor of claim 6, wherein the linear gear comprises at least one gear surface, the gear mechanism comprises at least one connecting gear to contact the at least one gear surface of the linear gear, the at least one connecting gear being connected to a piston rod, and the at least one gear surface being configured to provide a pre-determined and controlled travel path for the piston rod and piston.

8. The compressor of claim 7, wherein the gear surface is substantially parallel with the longitudinal axis of the linear gear.

9. The compressor of claim 8, wherein the gear surface is selected from the group consisting of square-toothed, grooved, and serrated.

10. The compressor of claim 1, wherein the mechanism is a track mechanism.

11. The compressor of claim 10, wherein the track mechanism includes a drive block having an embedded track, a drive pin at least partially disposed in the embedded track and connected to the linear motor and one or more piston rods, the drive pin being configured to move in the track to move the one or more piston rods in response to operation of the linear motor.

12. The compressor of claim 11, wherein the track has a shape and slope to permit the drive pin to smoothly engage one or more piston rods to drive the corresponding pistons up and down in the cylinder and the track is configured to provide a pre-determined and controlled travel path for the one or more piston rods and pistons.

13. The compressor of claim 12, wherein the travel path includes a constant predetermined top-dead center piston position and bottom-dead center piston position.

14. The compressor of claim 13, wherein the track comprises at least one substantially horizontal non-sloped track section corresponding to the top dead center piston position and to the bottom dead center piston position, wherein the piston is relatively motionless in the cylinder until the pin is pulled or pushed back into the sloped portion of the track by the linear motor.

15. A mechanism to connect a linear motor to a piston-cylinder arrangement, the mechanism having a mechanical configuration to limit overtravel and undertravel of the piston in the cylinder.

16. The mechanism of claim 15 wherein the mechanism comprises a connecting rod and eccentric.

17. The mechanism of claim 16 wherein the mechanism comprises a cam mechanism.

18. The mechanism of claim 17 wherein the mechanism comprises a wobble plate mechanism.

19. The mechanism of claim 18 wherein the mechanism comprises a gear mechanism.

20. The mechanism of claim 19, wherein the gear mechanism comprises a linear gear connected to the linear motor.

21. The mechanism of claim 20, wherein the linear gear comprises at least one gear surface, the gear mechanism comprises at least one connecting gear to contact the at least one gear surface of the linear gear, the at least one connecting gear being connected to a piston rod, and the at least one gear surface being configured to provide a pre-determined and controlled travel path for the piston rod and piston.

22. The mechanism of claim 21, wherein the at least one gear surface is substantially parallel with the longitudinal axis of the linear gear.

23. The mechanism of claim 22, wherein the at least one gear surface is selected from the group consisting of square-toothed, grooved, and serrated.

24. The mechanism of claim 15, wherein the mechanism is a track mechanism.

25. The mechanism of claim 24, wherein the track mechanism includes a drive block having an embedded track, a drive pin at least partially disposed in the embedded track and connected to the linear motor and one or more piston rods, the drive pin being configured to move in the track to move the one or more piston rods in response to operation of the linear motor.

26. The mechanism of claim 25, wherein the track has a shape and slope to permit the drive pin to smoothly engage one or more piston rods to drive the corresponding pistons up and down in the cylinder and the track is configured to provide a pre-determined and controlled travel path for the one or more piston rods and pistons.

27. The mechanism of claim 26, wherein the travel path includes a constant predetermined top-dead center piston position and bottom-dead center piston position.

28. The mechanism of claim 27, wherein the track comprises at least one substantially horizontal non-sloped track section corresponding to the top dead center piston position and to the bottom dead center piston position, wherein the piston is relatively motionless in the cylinder until the pin is pulled or pushed back into the sloped portion of the track by the linear motor.